



INTERNATIONAL SPACE STATION FLUIDS AND COMBUSTION FACILITY



NASA Lewis Research Center

Autumn '98

INTRODUCTION

The International Space Station United States Laboratory Module will contain the Fluids and Combustion Facility, designed and built at NASA Lewis Research Center in Cleveland Ohio.

The Fluids and Combustion Facility (FCF) is a modular, multi – user, microgravity science facility which will occupy three powered Space Station racks and approximately the equivalent volume of unpowered stowage. The three racks together will provide the physical and functional infrastructure required to perform combustion science, fluids physics and adjunct science on-board the International Space Station.



The facility will be launched incrementally in three separate, integrated racks beginning in 2001. The first rack is the Combustion Integrated Rack (CIR) and will accommodate combustion science Principle Investigators (PIs). The second rack is the Fluids Integrated Rack (FIR), scheduled to launch in year 2002, and will accommodate fluids physics PIs. In 2003, the Fluids and Combustion Facility will be complete with the addition of the third rack. The FCF in its assembly complete flight configuration will add additional science experiment capabilities.

Visit the FCF Home Page for additional details:

<http://zeta.lerc.nasa.gov/fcfwww/index.htm>



SCIENCE ACCOMMODATIONS

Once the FCF is complete, it will nominally accommodate an average of ten each of Combustion and Fluids PI experiments per year over an expected 10 year life cycle. It is anticipated that approximately 80% of all new fluids physics and combustion science PIs that enter the Microgravity Research Program via the NASA Research Announcement Process (NRA) will be accommodated by the FCF. The FCF is designed to increase the amount and quality of scientific data and decrease the cost of an individual experiment relative to alternative carriers.

The types of Combustion Science to be accommodated includes:

- Laminar Flames
- Reaction Kinetics
- Droplet and Spray Combustion
- Flame Spread, Fire and Fire Suppressants
- Condensed Phase Organic Fuel Suppressants
- Condensed Phase Organic Fuel Consumption
- Turbulent Combustion
- Soot and Polycyclic Aromatic Hydrocarbons
- Materials Synthesis
- Detonations and Explosions

The types of Fluids Physics Experiment to be accommodated includes:

- Capillary (Isothermal)
- Colloids
- Thermo-capillary

- Fluid Rheology, including polymers
- Electro-hydrodynamics
- Multiphase Flow
- Granular Flow
- Granular Media
- Critical Fluids
- Diffusive Phenomena

HARDWARE DESCRIPTION

The FCF will structural interfaces and rack closure doors. The environmental control subsystems will provide air thermal control, water thermal control, fire detection and suppression, and a nitrogen gas interface. Active rack isolation (ARIS) is integral to all three racks along with electrical power conversation and distribution, command and data management, image processing, communication interfaces with the ISS.

OPERATIONS

The FCF will be tele-operated from the NASA Lewis Research Center. In concert with the Cleveland based Operations Team, the Principle Investigator's experiment will be remotely monitored and controlled from the PI's home-site.

POINTS OF CONTACT

FCF Project Manager
Ed Winsa
216/433-2861

FCF Deputy Project Manager /
Combustion Element Manager /
FCF Systems Manager
Robert Zurawski
216/433-3932

FCF Fluids Element Manager
Robert Corban
216/433-6642

FCF Ground Segment Manager
Diane Malarik
216/433-3203

FCF Common Hardware Manager
Terri Rodgers
216/433-8740

FCF Operation Manager
Terry O'Malley
216/433-2960

ISS Utilization Manager
Marsha Nall
216/433-5374